DETAILED ACTION

Status of Claims

1. This action is in reply to the response to the first non-final rejection filed on 29 February 2008.
2. Claims 1–6 have been amended.
3. Claims 1–6 are currently pending and have been examined.

Response to Amendment

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action.
5. The objections to the drawings in the previous office action are withdrawn, in response to Applicant's new drawings.
6. The objection to the specification in the previous office action is withdrawn in light of Applicant's amendments to the specification. Examiner has entered the amended specification.
7. The rejections of claims 1, 3, 4 and 6 under 35 U.S.C. §112, 2nd paragraph pertaining to the use of the terms 'best match' are withdrawn in light of Applicant's amendments to claims 1, 3, 4, and 6.
8. The rejections of claims 1–6 under 35 U.S.C. §101 are withdrawn in light of Applicant's amendments.

Response to Arguments

Applicant's arguments filed 29 February 2008 are moot in light of Applicant's amendments which are addressed in the claim rejections below.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nau (*Time Series Forecasting in Statgraphics, 2002*) in view of .Bunn (*Comparison of seasonal estimation methods in multi-item short-term forecasting, YEAR*).

Claim 1:

Nau teaches computer implemented methods and associated computer readable program code for forecasting product demand with seasonality effects and further discloses and/or describes the following limitations, as shown:

- *comparing the historical [weekly] sales data for one of said plurality of products obtained from said data warehouse with each one of said [seasonal] models stored within said computer storage device;* (Nau describes use of Stratgraphics software for forecasting and further states: "Model Comparisons: One text report that is particularly interesting (and unique to Statgraphics) is the Model Comparison report [...] which gives side-by-side statistical comparisons of all models fitted, both in-sample and out-of-sample, plus a summary table of residual diagnostic test results. This report is a very powerful tool for comparing models [...]" (emphasis added)) *for each comparison between the historical weekly sales data for said one of said plurality of products and one of said [seasonal] models, calculating a variance* (Nau, on page 2: "Look to see which models are best in-sample and which are best out-of-sample in terms of mean squared error, mean absolute percentage error, etc." (emphasis added))*; and*

- *associating said one of said plurality of products with the [seasonal] model having the smallest variance associated therewith* (Nau, page 2: "In general, *the smaller and more random the errors, the better*, but you should not always slavishly pick the model that is "best in the rankings": there are other factors to weigh as well." (emphasis added).)

Nau does not specifically teach the methods relating to the storing of seasonal models *per se,* but Bunn, in an analogous art, as shown, does.

- *storing within an electronic data warehouse* (see at least Bunn (1999) p. 431, first sentence: "…product re-ordering and inventory management is now well developed in terms of data base design…", and p.442: "large-scale analyses still need to be undertaken to develop robust grouping and estimation facilities within the very large *database* software which characterise commercial practice in this area." (emphasis added) and where 'database software' indicates an *electronic data warehouse*) *historical weekly sales data for said plurality of products* (see at least Bunn (1999) p.432, para 1: "Alternatively, Withycombe (1989) ('WGSI') combines the *historical data* for all *products* within a group by adding their unit demands for each time period." Bunn further describes different time periods, specifically at the top of page 432: "…are revised less frequently than level and trend estimates in normal adaptive forecasting methods (yearly rather than monthly or **weekly**)…" Emphasis added.).
- *storing within a computer storage device [defining] a plurality of seasonal models* (see the text in the preceding limitation rejection)*, each one of said seasonal models modeling an annual sales pattern for a group of products associated with said one of said seasonal models, [and computer readable program code];* (see the text in the preceding limitation rejection and at least Bunn p.432: "This group seasonal index is subsequently used for all items belonging to the group." (emphasis added)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the model development, definition and comparison methods described in Nau with the methods for determining seasonality indices of Bunn as it is well-known and commonplace in the forecasting arts to utilize seasonality models and indices that account for

seasonality effects, as such models tend to be revised less frequently, and are "often used in business practice" (Bunn, p. 432, col.1). Furthermore, selecting a particular model from among an ensemble of models, that yield the smallest random errors, and thereby associate historical data with a particular model, is a well-known and commonplace practice as these generally provide the most accurate forecasts as noted above (Nau on page 2: "…the better…").

Claim 2

Nau does not specifically teach the following limitations, but Bunn as shown, does:

- *each one of said seasonal models comprises a series of weekly product group seasonal factors, each one of said weekly product group seasonal factors representing a ratio between:*
- *a total historical sales volume for all products in the group of products* (see at least Bunn (1999) p. 432: "Alternatively, Withycombe's (1989) ('WGSI') combines the historical data for all products within a group by adding their unit demands for each time period. Then, the new aggregated series' history is used to estimate the seasonal indices.") *represented by said one of said seasonal models during a one week period; and*
- *an average weekly sales volume for all products in the group of products represented by said one of said seasonal models, said average weekly sales volume being determined over a period of fifty-two consecutive weeks* (see at least Bunn (1999) p. 439: "In order to deseasonalize the data, the classical decomposition technique of multiplicative ratio-to-moving averages was implemented." Examiner notes that determining the average weekly sales volume 'over a period of fifty-two consecutive weeks' is a **moving average**. Examiner further notes that the term 'decomposition' in the forecasting arts can refer to a seasonality index wherein the numerator of the index is the value of an element in a time series and the denominator is a moving average of those values.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the model development methods of Nau with the methods for determining the seasonality indices of Bunn because the techniques of Nau specifically provide for the

specification of models and data input (Nau, p.1) and the definition of seasonality indices of Bunn provide useful seasonality models for which the techniques of Nau allow comparisons, hence indicate the model with the lowest forecasting error. Such use of seasonality models is old and well-known as well as commonplace and the general results and benefits of using the aforementioned seasonality indices would have been predictable.

Claim 3:

Nau does not specifically teach the following limitations, but Bunn as shown, does:

- *calculating a series of weekly product seasonal factors for said one of said plurality of products* (see at least Bunn p. 431, abstract: "This paper addresses the issue of **estimating** seasonal indices for multi-item, short-term forecasting, based upon both individual time series estimates and groups of similar time series." Emphasis added.), *each one of said weekly product seasonal factors representing a ratio between:*
  - *a historical sales volume for said one of said plurality of products during a one week period* (see at least Bunn (1999) p. 432: "Alternatively, Withycombe's (1989) ('WGSI') combines the historical data for all products within a group by adding their unit demands for each time period. Then, the new aggregated series' history is used to estimate the seasonal indices."); *and*
  - *an average weekly sales volume for said one of said plurality of products determined over a period of at least fifty-two consecutive weeks* (see at least Bunn (1999) p. 439: "In order to deseasonalize the data, the classical decomposition technique of multiplicative ratio-to-moving averages was implemented." Examiner notes that determining the average weekly sales volume 'over a period of fifty-two consecutive weeks' is a **moving average**. Examiner further notes that the term 'decomposition' in the forecasting arts refers to a seasonality index wherein the numerator of the index is the value of an element in a time series and the denominator is a moving average of those values.)*; and*
- *comparing said weekly product seasonal factors for said one of said plurality of products with the weekly product group seasonal factors for said seasonal models for corresponding weeks*

(see at least Bunn p. 432, section 2: "The key task in using grouped seasonal indices is the actual formation of the groups. The business reasons for grouping items […] may not be optimal for the statistical purpose of improving short-term forecasts. **A statistical grouping** would be expected **to improve forecast performance, to be intrinsic to the forecasting method,** but in practice probably would need to be maintained alongside the company's traditional hierarchical product line management." Emphasis added. The action of 'statistical grouping', in effect, entails the actions of **comparing** and **associating** time series and models and thereby establishes an equivalence to the limitations above.)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the model development, definition and comparison methods described in Nau with the methods for determining seasonality indices of Bunn as it is well-known and commonplace in the forecasting arts to utilize seasonality models and indices that account for seasonality effects, as such models tend to be revised less frequently, and are "often used in business practice" (Bunn, p. 432, col.1). Furthermore, selecting a particular model from among an ensemble of models, that yield the smallest random errors, and thereby associate historical data with a particular model, is a well-known and commonplace practice as these generally provide the most accurate forecasts as noted above (Nau on page 2: "…the better…").

Claim 4:

Nau teaches the following limitations, as shown:

- *computer processing means for comparing historical [weekly] sales data for one of said plurality of products with each one of said seasonal models* (Nau describes use of Stratgraphics software for forecasting and further states: "Model Comparisons: One text report that is particularly interesting (and unique to Statgraphics) is the Model Comparison report […] which gives side-by-side statistical comparisons of all models fitted, both in-sample and out-of-sample, plus a summary table of residual diagnostic test results. This report is a very powerful tool for comparing models […]" (emphasis added)) *for each comparison between the historical weekly sales data for said one of said plurality of products and one of*

said [seasonal] models, calculating a variance (Nau, on page 2: "Look to see which models are best in-sample and which are best out-of-sample in terms of mean squared error, mean absolute percentage error, etc." (emphasis added))*; for each comparison between the historical weekly sales data for said one of said plurality of products and one of said seasonal models, calculating a variance; and associating said one of said plurality of products with the seasonal model having the smallest variance associated therewith* (Nau, page 2: "In general, *the smaller and more random the errors, the better*, but you should not always slavishly pick the model that is "best in the rankings": there are other factors to weigh as well." (emphasis added).).

Nau does not specifically teach the system elements *per se,* but Bunn, in an analogous art, as shown, does.

- *an electronic database of historical weekly demand data* (see Bunn p.431-2: "This is because seasonal indices are revised less frequently … (yearly rather than monthly or **weekly**)…" Emphasis added.) *for a plurality of products* (see at least Bunn (1999) p. 431, first sentence: "product re-ordering and inventory management is now well developed in terms of **data base** design…", and p.442: "large-scale analyses still need to be undertaken to develop robust grouping and estimation facilities within the very large **database** software which characterise commercial practice in this area." Emphasis added.);
- *a computer storage device including a plurality of seasonal models, each one of said seasonal models modeling an annual sales pattern for a group of products associated with said one of said seasonal models* (see at least Bunn (1999) p.433 2nd full para.: "First, we use the business classes as given by the company. Second, we form groups of products within the business classes, using cluster analysis.)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the model development, definition and comparison means described in Nau with the electronic storage means for storing historical seasonality indices of Bunn as it is well-known and commonplace in the forecasting arts to utilize databases for storing historical data and

associated seasonality models (Bunn, p.442, col.1). Moreover, the benefits of combining the computer-based system and methods of Nau with methods pertaining to seasonality indices described in Bunn would have been predictable.

Claim 5:

Nau does not specifically teach the system elements *per se,* but Bunn, in an analogous art, as shown, does.

- *each one of said seasonal models comprises a series of weekly product group seasonal factors, each one of said weekly product group seasonal factors representing a ratio between:*
- *a total historical sales volume for all products in the group of products represented by said one of said seasonal models during a one week period* (see at least Bunn (1999) p. 432: "Alternatively, Withycombe's (1989) ('WGSI') combines the historical data for all products within a group by adding their unit demands for each time period. Then, the new aggregated series' history is used to estimate the seasonal indices."); *and*
- *an average weekly sales volume for all products in the group of products represented by said one of said seasonal models, said average weekly sales volume being determined over a period of fifty-two consecutive weeks* (see at least Bunn (1999) p. 439: "In order to deseasonalize the data, the classical decomposition technique of multiplicative ratio-to-moving averages was implemented." Examiner notes that determining the average weekly sales volume 'over a period of fifty-two consecutive weeks' is a **moving average**. Examiner further notes that the term 'decomposition' in the forecasting arts refers to a seasonality index wherein the numerator of the index is the value of an element in a time series and the denominator is a moving average of those values.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the model development, definition and comparison methods described in Nau with the methods for determining seasonality indices of Bunn as it is well-known and commonplace in the forecasting arts to utilize seasonality models and indices that account for

seasonality effects, as such models tend to be revised less frequently, and are "often used in business practice" (Bunn, p. 432, col.1).

Claim 6:

Nau does not specifically teach the system elements *per se,* but Bunn, in an analogous art, as shown, does.

- *calculating a series of weekly product seasonal factor for said one of said plurality of products* (see at least Bunn p. 431, abstract: "This paper addresses the issue of **estimating** seasonal indices for multi-item, short-term forecasting, based upon both individual time series estimates and groups of similar time series." Emphasis added.)*, each one of said weekly product seasonal factors representing a ratio between:*
  - *a historical sales volume for said one of said plurality of products during a one week period* (see at least Bunn (1999) p. 432: "Alternatively, Withycombe's (1989) ('WGSI') combines the historical data for all products within a group by adding their unit demands for each time period. Then, the new aggregated series' history is used to **estimate** the seasonal indices." Emphasis added.)*; and*
  - *an average weekly sales volume for said one of said plurality of products determined over a period of at least fifty-two consecutive weeks* (see at least Bunn (1999) p. 439: "In order to deseasonalize the data, the classical decomposition technique of multiplicative ratio-to-moving averages was implemented." Examiner notes that determining the average weekly sales volume 'over a period of fifty-two consecutive weeks' is a **moving average**. Examiner further notes that the term 'decomposition' in the forecasting arts refers to a seasonality index wherein the numerator of the index is the value of an element in a time series and the denominator is a moving average of those values.)*; and*
  - *comparing said weekly product seasonal factors for said one of said plurality of products with the weekly product group seasonal factors for said seasonal models for corresponding weeks* (see at least Bunn p. 432, section 2: "The key task in using grouped seasonal indices is the actual formation of the groups. The business reasons for

> grouping items […] may not be optimal for the statistical purpose of improving short-term forecasts. **A statistical grouping** would be expected **to improve forecast performance, to be intrinsic to the forecasting method**, but in practice probably would need to be maintained alongside the company's traditional hierarchical product line management." Emphasis added. Examiner notes that the action of 'statistical grouping', in effect, entails the actions of **comparing** and **associating** time series and models and thereby establishes an equivalence to the limitations above.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the model development, definition and comparison methods described in Nau with the methods for determining seasonality indices of Bunn as it is well-known and commonplace in the forecasting arts to utilize seasonality models and indices that account for seasonality effects, as such models tend to be revised less frequently, and are "often used in business practice" (Bunn, p. 432, col.1). Furthermore, selecting a particular model from among an ensemble of models, that yield the smallest random errors, and thereby associate historical data with a particular model, is a well-known and commonplace practice as these generally provide the most accurate forecasts as noted above (Nau on page 2: "…the better…").

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure with regard to seasonal models and comparisons thereof are:

- Forecasting: Methods and Applications, 3rd Edition, by Makridakis, *et al.* 1998.
- ForecastPRO, 1999.

These references describe the state-of-the-art in forecasting and further provide examples of how seasonal models are defined, selected, optimized and applied to various forecasting problems.

Any inquiry of a general nature or relating to the status of this application or concerning this communication or earlier communications from the Examiner should be directed to Dr. **Mark A. Fleischer** whose telephone number is **571.270.3925.** The Examiner can normally be reached on Monday-Friday, 9:30am-5:00pm. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, **Beth Van Doren** whose telephone number is **571.272.6737** may be contacted.

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Examiner, Art Unit 3623 20 May 2008

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